

Remarks

Claims 1, 5-8 and 11-25 are pending. All presently stand rejected. Re-examination and reconsideration are requested.

Claim Rejections - 35 U.S.C. § 112

Claims 1, 5-8 and 11-25 are rejected under 35 U.S.C. § 112, § 1. The Examiner was of the view that “The claim(s) contains subject matter which was not described in the specification . . .”

Independent claims 1, 22 & 25 have been amended so that each calls for “ . . . a metal substrate consisting essentially of a metal selected from the group consisting of carbon steel, austenitic stainless steel, and aluminum . . .” Explicit basis lies in the Specification on page 12 between lines 7 and 8, plus the test results reported in Table 3, pp. 16-17 (substrates identified as S45C, SUS304 and A6061).

As thus amended, the independent claims and all claims which depend therefrom are fully supported by the Specification.

Claim Rejections - 35 U.S.C. § 103

In paragraph 5 of the Office Action, claims 1, 5-8, and 11-25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sonoda et al in view of Shimakura et al, Witte and Bjerrum et al.

The Examiner observes that “ . . . the process of Sonoda et al. is applicable to a steel substrate so that Applicants' claims are not deemed to distinguish on this basis.”

As amended, the claims call for “a metal selected from the group consisting of carbon steel, austenitic stainless steel, and aluminum . . .” The claimed materials are examples of ferrous metals (except for aluminum). There is a distinction among those skilled in the art between ferrous and non-ferrous materials. The point with titanium (Sonoda et al) is that no coating will form without the electrolytic process. The current provides the generation of hydrogen ions from the surface that causes a pH gradient near the surface which triggers the deposition reaction in the near-surface area – resulting in a coating.

In the case of iron-based materials, the phosphate reaction will occur naturally (without induced current) due to ion exchange of iron from the surface with zinc phosphate in solution. A by-product of the reaction is hydrogen evolution at the surface which again triggers zinc phosphate deposition. However, another by-product is iron phosphate which tends to precipitate-forming “sludge” which can be detrimental to the coated part. Electrolytic enhanced deposition switches the source of hydrogen evolution so that iron is not reacted from the surface and no sludge forms.

Thus, there is a clear distinction between the different mechanisms and results that follow from electrolytic enhancement based on ferrous (invention) and non-ferrous (Sonoda et al) materials.

Sonoda et al '480 is limited to “titanium and titanium alloys” also for these reasons: Here is what Sonoda et al discloses:

In the case of steel, for example, oil containing an extreme pressure agent is used in comparatively light working and a soap or solid lubricant in addition to a phosphate or oxalate is used in heavy working.

As with cold working of steel, there are various ways of working titanium and titanium alloys. More specifically, there is drawing of pipes, drawing of wires, header processing and cold rolling of sheets. Unfortunately, at the present time there

is no satisfactory lubricant that is suited to the various working processes in the case of titanium and titanium alloys.”

Thus, Sonoda et al admits that “At the present time there is no satisfactory lubricant that is suited to the various working processes *in the case of titanium and titanium alloys.*” Thus, the teachings of ways to work cold work steel are not transferrable to “titanium and titanium alloys.” And vice-versa.

Further, the claims of Sonoda et al are all limited to “an object made of titanium or a titanium alloy.”

For these reasons, it cannot be said that the process of Sonoda et al is applicable to a carbon steel or an austenitic stainless steel as now claimed. Claims 1, 5-8, and 11-25 are therefore allowable over Sonoda et al. The ancillary references, if properly combinable, fail to remedy the deficiencies of the primary reference for the reasons stated above and in the Amendment dated March 1, 2004.

In paragraph 7 of the Office Action, the Examiner commented on the limitation that the phosphate conversion coating “is applied in an amount of 6-20 grams of film per square meter of metal substrate.” The Examiner's view is that “[t]he thickness of an applied phosphate coating is a result effective variable which is chosen to provide the desired properties”, and that this is taught by Bjerrum et al.

Applicants' Specification teaches that:

“. . . it is desirable for the chemical conversion film to have a thickness corresponding to a mass per unit area of 6 to 20 grams of film per square meter of surface coated . . . with conventional methods, more sludge was produced if such a thick chemical conversion film was formed. A subordinate object of the present invention is accordingly to form a thick phosphate

conversion film coating without producing so much sludge.

Also, with conventional methods, a long contact time with the chemical conversion treatment liquid was required to perform a thick conversion film; this diminished productivity. An additional subordinate object of the present invention is to form a thick phosphate conversion film at a high level of productivity. Further, with conventional methods, it was not easy to form a thick phosphate conversion film on stainless steel or the like, for example."

Specification, p. 4, ll. 12-23.

The results in Table 3 of the Specification indicate that only the examples according to the invention were effective in accomplishing all of the objects of the invention. In comparative examples (CE) 1-7, 9, and 11-14, substantial amounts of sludge were formed during the phosphating operation. In comparison examples (CE) 7, 8, 10, 15 and 16 poor to very poor punching depth was obtainable with the lubricated film formed.

The criticality of the claimed range is therefore demonstrated by comparative examples included in the Specification. Accordingly, it cannot be said that ". . . the choice of the amount of phosphate coating deposited (thickness) is a matter of routine optimization."

In paragraph 8 of the Office Action, the Examiner discusses the claim amendment which recites that the coating is formed "without generating sludge". Sludge formation is not discussed in Sonoda et al because iron is not present in the system to begin with. Iron is the source of sludge. Preventing sludge formation is unique to iron-based substrates.

The arguments made in the Amendment Under 37 C.F.R. § 1.116 dated March 1, 2004 are incorporated here by reference. The Examiner is respectfully asked to review and reconsider those arguments. If a telephone interview would expedite prosecution, the Examiner is asked to contact the undersigned.

Respectfully submitted,
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